BEST AVAILABLE IMAGES

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images may include (but are not limited to):

- BLACK BORDERS
- TEXT CUT OFF AT TOP, BOTTOM OR SIDES
- FADED TEXT
- ILLEGIBLE TEXT
- SKEWED/SLANTED IMAGES
- COLORED PHOTOS
- BLACK OR VERY BLACK AND WHITE DARK PHOTOS
- GRAY SCALE DOCUMENTS

IMAGES ARE BEST AVAILABLE COPY.

As rescanning documents *will not* correct images, please do not report the images to the Image Problem Mailbox.

PCT WORLD INTELLECTUAL PROPERTY ORGANIZATION
International Bureau

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification ⁶: H04N 5/782, 7/08, 5/76 — A1

(11) International Publication Number: WO 95/07003

(43) International Publication Date: 9 March 1995 (09.03.95)

(21) International Application Number: PCT/US94/09857

(22) International Filing Date: 2 September 1994 (02.09.94)

(30) Priority Data:
08/117,579 3 September 1993 (03.09.93) US

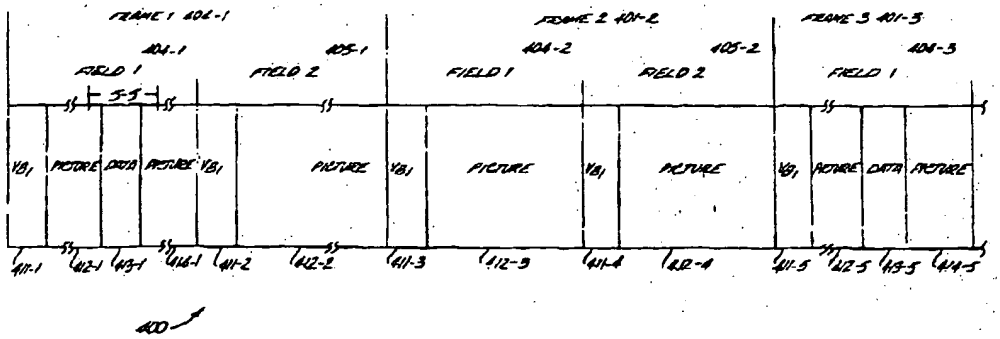
(71)(72) Applicant and Inventor: YUEN, Henry, C. [US/US]; P.O. Box 1159, Redondo Beach, CA 90278 (US).

(74) Agent: RAHN, Leroy, T.; Christie, Parker & Hale, P.O. Box 7068, Pasadena, CA 91109-7068 (US).

(81) Designated States: AM, AT, AT (Utility model), AU, BB, BG, BR, BY, CA, CH, CN, CZ, CZ (Utility model), DE, DE (Utility model), DK, DK (Utility model), EE, ES, FI, FI (Utility model), GB, GE, HU, JP, KE, KG, KP, KR, KZ, LK, LR, LT, LU, LV, MD, MG, MN, MW, NL, NO, NZ, PL, PT, RO, RU, SD, SE, SI, SK, SK (Utility model), TJ, TT, UA, US, UZ, VN, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG), ARIPO patent (KE, MW, SD).

Published
With international search report.
Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.

(54) Title: TRANSMISSION OF DATA USING FULL FRAME VIDEO



(57) Abstract

An electronic program guide is transmitted, along with a displayable video program (412), as an encoded signal on a plurality of video lines of a broadcasted video signal (400). The data is broadcasted on one field per two video frames, or less frequently, to thereby create a video image on a screen that is not detectable by a human viewer. Accordingly, the displayed data does not interfere with the displayable video program. The program guide is a listing of television programs that are to be broadcasted during a predetermined time period for at least one television channel. Advertising, explanatory information, or other auxiliary video information may be transmitted in the video signal.

FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AT	Austria	GB	United Kingdom	MR	Mauritania
AU	Australia	GE	Georgia	MW	Malawi
BB	Barbados	GN	Guinea	NE	Niger
BE	Belgium	GR	Greece	NL	Netherlands
BF	Burkina Faso	HU	Hungary	NO	Norway
BG	Bulgaria	IE	Ireland	NZ	New Zealand
BJ	Benin	IT	Italy	PL	Poland
BR	Brazil	JP	Japan	PT	Portugal
BY	Belarus	KE	Kenya	RO	Romania
CA	Canada	KG	Kyrgyzstan	RU	Russian Federation
CF	Central African Republic	KP	Democratic People's Republic of Korea	SD	Sudan
CG	Congo			SE	Sweden
CH	Switzerland	KR	Republic of Korea	SI	Slovenia
CI	Côte d'Ivoire	KZ	Kazakhstan	SK	Slovakia
CM	Cameroon	LI	Liechtenstein	SN	Senegal
CN	China	LK	Sri Lanka	TD	Chad
CS	Czechoslovakia	LU	Luxembourg	TG	Togo
CZ	Czech Republic	LV	Latvia	TJ	Tajikistan
DE	Germany	MC	Monaco	TT	Trinidad and Tobago
DK	Denmark	MD	Republic of Moldova	UA	Ukraine
ES	Spain	MG	Madagascar	US	United States of America
FI	Finland	ML	Mali	UZ	Uzbekistan
FR	France	MN	Mongolia	VN	Viet Nam
GA	Gabon				

TRANSMISSION OF DATA USING FULL FRAME VIDEO

Field of the Invention

This invention relates to broadcasting television signals, and, more particularly, to a transmission system for encoding data in the video portion of a television signal.

Background of the Invention

Presently, a viewer of television receives a television programming list in either a magazine format, such as TV Guide, or from daily or weekly listings in a newspaper. The viewer must then read through several pages of listings to locate and determine programs that the viewer intends to view or record. If he decides to record the program, he must program a video cassette recorder (VCR), using a remote controller or buttons on the body of the VCR, by entering programming information or encoded numbers representative of such information.

Currently, closed caption signals for the hearing impaired transmit in the Vertical blanking interval (VBI) a text signal corresponding to the dialog of the characters in the corresponding video program. It has been proposed to broadcast electronic television program guides by encoding the guide data in the VBI of broadcasted video programs.

Broadcasting data in the VBI over cable television systems presents problems. Unlike cable television, over the air systems broadcast video signals directly from a local broadcaster to a viewer's antenna for reception, without third party intervention. However, in cable television systems, which are becoming more predominant, a local cable company frequently strips off the VBI information provided by the broadcaster and replaces it with data of the cable company's own choosing. Because of the difficulty of controlling cable companies from stripping the data, the broadcasters face revenue losses from

advertisers or other information providers because of the lost audiences of the messages in the VBI.

Experiments were run where the entire full frame visible portion of the video signal was used to send data. However, this required a limited experimental license from the Federal Communications Commission (FCC), because the broadcasted signal presents an annoyance to viewers who perceive the data as noise on the screen. Under these licenses, the FCC required the operator to first warn viewers, by both video and audio warnings, of the following data transmission and to inform them that there was nothing wrong with their receivers.

Using full frame video presents a problem during the periods in which data is transmitted. In particular, viewers are annoyed, because the received message appears as noise to the viewers. Accordingly, any large scale use of full frame video will probably be restricted to time periods or channels for which the viewing audience is small. This thereby restricts the timeliness and value of the transmitted data.

It is the object of the invention to have a video broadcast system that transmits data that a cable company will not strip. It is another object of the invention to transmit data that is not an annoyance to the viewer. It is a further object of the invention to provide data to the viewer in a timely manner.

It is yet another object of the invention to provide a program guide that is broadcasted to the user and which provides current scheduling and descriptive information that includes special events which are scheduled on short notice. It is a further object that the program guide be usable for timer programming a VCR with minimal interaction by the user so that the user finds time shifting of programs easier.

Summary of the Invention

In one embodiment, a microprocessor controller is coupled to a video signal decoder for decoding data, e.g., a television program guide, transmitted in the video image part of a video frame of a broadcast television signal. The decoded data is stored in a memory. The data is displayed on a video screen but it is displayed at such a rate that the image of the data is not perceivable by a viewer.

The video data for the program guide comprises a program title, channel, date, time, length, encoded numbers, sort categories, and control and attribute

codes. The program guide may be searched by one of several categories such as date, program type, and channel.

In another embodiment, auxiliary video information of a first program, such as the channel-date-time-length of a related second program, is broadcasted in the video frames of the first program. In response to a user input, the auxiliary video information is retrieved from the video frames and used for automatically setting a VCR to record the related second program.

In yet another embodiment, the auxiliary video information is text data relating to the first program. In this embodiment, the video system has means responsive to a user input for storing the text data in a memory so that it can be displayed at a selected time.

In still yet another embodiment, an input/output port is provided so that the user may connect the video system to a printer or other external device, such as an external memory. The auxiliary video information or program guide may be printed in hard copy.

Brief Description of the Drawings

The foregoing features of the present invention will be better understood in consideration of the following detailed description of certain preferred embodiments, taken in conjunction with the accompanying drawings in which:

FIG. 1 is a block diagram of a video system that processes auxiliary video information recorded on broadcasted video images according to principles of the invention;

FIG. 2 illustrates an embodiment of a remote control unit for operating the video system of FIG. 1;

FIG. 3 is a schematic diagram illustrating the interlaced scanning pattern on a screen of a conventional television receiver;

FIG. 4 is a schematic diagram illustrating the data encoded video image according to principles of the invention;

FIG. 5 is a timing diagram showing the level of the signals in the picture and data interval in the time interval 5-5 shown in FIG. 4;

FIG. 6 is a schematic view showing the format for the video data image packet recorded in the video;

FIG. 7 is a flowchart showing the steps employed in the operation of the video system according to principles of the invention;

FIG. 8 shows the a menu of categories displayed upon its selection during the operation of the video system as shown in FIG. 7; and

FIG. 9 shows the Calendar-by-Date Menu displayed upon its selection in the category menu of FIG. 8.

Detailed Description

VIDEO SYSTEM

FIG. 1 is a block diagram of a video system that processes auxiliary video information recorded on broadcasted video images according to principles of the invention. A tuner 12 receives on a coaxial cable 18 a broadcast TV signal from either an antenna 14 or a cable TV box 16. Alternatively, the cable box 16 may receive signals from a satellite receiver system. The cable box 16 may also decipher encrypted video signals that the cable or carrier operator encrypts to prevent unauthorized viewing.

The tuner 12 down converts the received broadcast video signal from one of several different video channels onto a common unused television channel, typically channel 3 or 4. The particular channel is not critical, and for the purposes of this discussion, channel 3 is used. The tuner 12 provides on a coaxial cable 20 the down converted signal to a video cassette recorder (VCR) 22. Alternatively, the tuner 12 may be in the VCR which is common in the majority of consumer VCRs for off-the-air recording. In this alternative, the cable 20 is a tap off an output port (not shown) of the VCR 22 and the cable 18 is coupled directly to the VCR.

The VCR 22 is a conventional videotape reader/recorder device and uses any one of many different recording technologies such as Beta, VHS, super VHS, 8 mm VHS-C, and the like. The technology and operation of a VCR are well understood in the art.

The tuner 12 also provides the down converted video signals to a VBI decoder 24 which decodes data recorded on the vertical blanking interval (VBI) of the received video signal, and to a VBI encoder 26, which encodes data onto the VBI of the video signal that is to be recorded on a video tape (not shown) in the VCR 22. In addition, the tuner 12 also provides the down converted signal to a video signal decoder 28 which detects and decodes data recorded on the video picture portion of the video signal as will be described in detail below in conjunction with FIGs. 3-5, and to a mixer 30 whose mixed output is provided on a line 32 to a video display 34. The video display 34 may be a television, a liquid crystal display, and the like. The video display 34 may also display data stored in the RAM 48 or commands entered through the remote control 38.

A microprocessor controller (shown as μP in Fig. 1) 36 controls the operation of the tuner 12, the VCR 22, the VBI decoder 24, the VBI encoder 26, the video signal decoder 28, and the mixer 30. The microprocessor controller 36 controls the operation of the VCR 22 by providing on a line 37 control signals

to the VCR in response to user selected commands or the result of operations of the controller. The microprocessor controller 36 receives user selected commands from a remote controller unit 38 (also referred to as "remote control"), which is coupled by wireless means known in the art, such as infrared, ultrasonic, or radio frequency, to a wide angle remote signal detector 40 which can detect the infrared signals from the remote control which may be anywhere in the room in which the video system 10 is located. The remote signal detector 40 converts the user selected commands into electrical control signals by means well known to those skilled in the art and provides on a line 42 such control signals to the microprocessor controller 36.

The remote control 38 preferably includes the control functions for controlling the operation of the tuner 12, the VCR 22, and the program guide functions of the microprocessor 36 as will be described below. Alternatively, the remote control 38 may be a universal remote controller for controlling a plurality of other electronic devices (not shown), such as radio receivers, compact disk players, and the like.

FIG. 2 illustrates an embodiment of a remote control unit 38 for operating the video system of FIG. 1. As is known in the art, the remote controller 38 has a plurality of push buttons and switches which create output infrared signals in response to user actuation of the same. A command mode selector switch 202 enables activating the control unit. A plurality of channel number buttons 203 enable remote entry of channel numbers. An enter button 204 is used to enter channel numbers and menu options in the methods discussed below. A menu button 205 is used to display the menu of user options as discussed below. A plurality of cursor buttons 206, each marked with an arrow, is used to move a cursor on the video display 34 in various menu operations. An antenna TV/VCR button 208 is used to command the video display 34 to display a signal coming from either the antenna 14 or the output of the VCR 22. A power switch 209 enables or disables power to the VCR 22. A TV/VCR switch 210 selectively enables using the remote control 38 to control the VCR 22 or the video display 34. An input select button 211 enables selection of the source to be recorded. Channel change buttons 212 enable toggling the channel selection up and down. Similarly, volume buttons 213 enable toggling the volume louder or softer. A record mode button 214 enables selection of recording tape speed. A timer clear button 215 is used to clear timer settings of the VCR. A timer record button 216 is used to enter a timer recording mode. An index button 217 is used to enter an index mode for searching for selections on the video tape. Other

buttons 218 can be used to control various functions of the VCR, including the direction, speed, and mode of the tape transport, such as rewind, play, record, fast forward, pause, single frame advance, and slow motion. The functions and implementation of each button are well known in the art.

A print button 221 allows the user to print a hard copy of data stored in the RAM 48. Page up and down buttons 222, 223 are used to move up or down pages on the screen. A cancel button 224 is used to cancel selection made. Enter button 225 is used to enter channel numbers in menu options methods described herein. A review button 226 is used to reviewed stored selections. A program identification button (program I.D) 227 is used to display the program title and other information of the program being viewed. A select button 228 allows the viewer to select entries on menus. An exit button 229 allows the viewer to exit from a menu that the viewer is presently watching. An info button 230 (also referred to as "I button") allows the viewer to request auxiliary information as will be described below.

The terms button and key are used interchangeably throughout this description. The details of the operation of these button are discussed below as part of the explanation of the feature of the video system 10, and subsequent discussions about the operation of the video system the terms "entering" or "sending" a command with the remote control 38 means the corresponding key on a remote control has been pressed and the remote control can convert the command into an infrared signal that is transmitted to the remote signal detector 40. For example, pressing the exit key causes the remote control 38 to send an infrared signal corresponding to an exit command. These terms are used interchangeably.

Returning now to FIG. 1, the microprocessor controller 36 comprises an integrated circuit microprocessor and a clock for generating a clock signal for timing functions and providing the time. The time may be set using the remote control 38 in a manner well known in the art. The clock has its own backup battery (not shown) to allow the system to retain the time during power outages and interruptions. Alternatively, the VCR 22 may maintain the time.

A read only memory (ROM) 44 stores a basic operating program, the VBI encoding and decoding programs, and the video image data decoding programs, which the ROM provides on a line 46 to the microprocessor controller 36. At system power up, the microprocessor controller 36 reads the basic operating program from the ROM 44 and executes a start up routine.

A random access memory 48 is coupled by a bi-directional bus 50 to the microprocessor controller 36. The RAM 48 is preferably non-volatile, such as electrically erasable programmable read only memory (EEPROM). Alternatively, the RAM 48 may be battery backed up. The RAM 48 stores the system software of the microprocessor controller 36 and stores the electronic program guide transmitted in the video signal as will be described below. The size of the RAM 48 is set by the user or manufacturer per their requirements for the number of channels, duration, program description, and the like for the television program listings that are to be stored. For example, storing more channels and longer lengths of time of program guides each require larger memory capacity. Effective memory size of the RAM 48 may be increased by using well known data compression techniques. Alternatively, the memory 48 may be comprised of other types of memory such as floppy disks, optical disks, magneto-optical disks or other magnetic disks. The RAM 48 may be partitioned to include a temporary buffer for temporarily storing received video data, a permanent buffer for long term storing of received video data, and a guide memory for the program guide.

The system architecture of the video system 10 in FIG. 1 shows the microprocessor controller 36 having multiple inputs and outputs to several functional units such as the video signal decoder 28, the VBI encoder 26, the VBI decoder 24, the RAM 48, the ROM 44, and the like. An alternate embodiment (not shown) using a common bus structure may be used. In this alternate embodiment, the aforementioned functional units and the microprocessor controller each connect to a common bus.

A character generator 52 receives character data on a line 54 from the microprocessor controller 36 and provides on a line 56 video characters to the mixer 30. The character generator 52 has an internal ROM (not shown) for storing a data table representing pixel or bit map patterns of a plurality of alphanumeric characters, such as the Roman alphabet and the Arabic numerals. The word "text" is used herein to describe either characters or graphics. In response to character and position commands from the microprocessor controller 36, the character generator 52 reads from its internal ROM the character bit map corresponding to the commanded character and provides it on a video output signal to the mixer 30 for positioning on the video display 34 at coordinates determined by the commanded position. The end result is the visual display of an alphanumeric character on the video display 34. Character generators are well known for channel display in television receivers and for use in professional titling equipment.

The mixer 30 selectively provides in response to commands from the microprocessor controller 36 either the video signal from the tuner, the VCR 22 or the character generator 52 or a combination of the three. In particular, the mixer 30 switches between five modes: a TV mode, a VCR mode, a graphics mode, a combined TV/graphics mode, or a combined VCR/graphics mode. In the TV mode, the mixer 30 provides the output from the tuner 12 to the display 34. This mode is the normal operational mode, while the viewer is watching television. In the VCR mode, the mixer 30 provides the video signal output from the VCR 22 to the display 34. This mode is the normal operational mode while the viewer is playing the VCR 22. In the text mode, the video modulated text from the character generator 52 is provided to the video display 34. As will be described below, this mode is the normal operational mode for using the electronic program guide. In either the combined TV/text or VCR/text modes, the text is modulated onto the channel 3 video signal from the tuner 12 or VCR 22, respectively. This mode is used to provide the electronic program guide while the viewer is watching TV or playing the VCR.

An interface (I/F) connector 68 is coupled to the microprocessor controller 36 and allows communication between the microprocessor controller 36 and an external device 70. The connector 68 includes interface circuitry, such as input/output (I/O) buffers and preferably has an RCA phono female connector. The external device 70 may be a memory, such as additional RAM, a disk or a tape, or a printer. In a specific implementation, the microprocessor controller 36 communicates with a printer 70 to print parts of the electronic television program guide described below.

In an alternate embodiment, in place of the interface connector 68, an infrared detector/emitter in the video system 10 functions as a data port which can be used to both receive remote control commands and to transmit the program guide from the RAM 48 to the printer 70.

While a VCR, an antenna, and a cable box are all shown in the configuration of FIG. 1, the invention may be used with just one of these devices. Furthermore, although the devices are shown as individual units, they may also be combined devices, for example, the display 34 and the VCR 22 may be built as one unit. Moreover, one electronic device, such as the microprocessor controller 36, may be combined with another electronic device, such as the VCR 22, into one unit.

VIDEO SIGNAL FORMAT

FIG. 3 is a schematic diagram illustrating the interlaced scanning pattern on a screen of a conventional television receiver.

Video images in a cathode ray tube (CRT) type-video device, e.g. television, are generated by scanning a beam along a predefined pattern of lines across a screen. Each time all the lines are scanned, a frame is said to have been produced. In one implementation, such as used in the United States, a frame is scanned 30 times per second. Each television frame comprises 525 lines which are divided into two separate fields, referred to as field 1 ("odd field") and field 2 ("even field"), of 262.5 lines each. Accordingly, these even and odd fields are transmitted alternately at 60 Hz. The lines of the even and odd fields are alternately interleaved to produce the full 525 line frame once every 1/30 of a second in a process known as interlacing. Many other standards in the world use 625 lines of information and interlace 312 and 313 lines at 50 fields per second. In the United States 525 line standard, approximately 480 lines are displayed on the television screen.

Referring now to FIG. 3, the video display 34 scans the beam from the top left hand corner and scans across the screen (line 21, field 1 in FIG. 3). After it finishes scanning the first line, the beam returns to the left hand side during a period known as a horizontal blanking interval and repeats scanning along another line which is parallel to but lower than the previous line (line 22, field 1 in FIG. 3). The scanning continues along the odd numbered lines until the beam reaches the center of the bottom part of the screen (line 263, field 1). These odd numbered lines form field 1.

From the bottom center of the screen, the beam returns to the top where it starts scanning from substantially the center of the screen along the even numbered lines which interlace the lines of field 1. This is not an instantaneous bottom to top jump but actually requires the length of time to scan 20 horizontal lines (left-right diagonal trajectory to the top of the picture). These lines are numbered 264 through 283. The even numbered lines form field 2. When the beam reaches the bottom, right hand corner of the screen, the picture frame is formed. In the NTSC protocol widely used in North America, each field contains 262.5 horizontal lines and a pair of fields constitute a single 525 line video frame and creates one video picture at one instant in time on the video display 34.

During the time in which the beam returns from the bottom to the top of the screen between the fields it carries no television signals because it does not produce any picture element on the screen. This time interval is generally known as the vertical blanking interval (VBI). Its duration is typically 20 times the time

duration that it takes the beam to scan across the screen. In other words, the duration of the VBI is equal to the time for the beam to scan 20 lines. Thus, the VBI typically contains a plurality of lines and is identified by the field with which it is associated. Apparatus and methods using these techniques are well known in the art and therefore are not discussed in detail herein.

Because no image is produced on the display during the vertical blanking interval, no information therefore needs to be carried by the broadcast signals. However, proposals have been made to use the VBI for conveying auxiliary information from a television network or station to an audience. For example, closed caption data associated with the television program are transmitted as encoded composite data signals during VBI line 21, field 1 of the standard NTSC video signal at a rate of 480 bits per second.

As will be described in detail below, auxiliary video information is recorded on the video signal that forms a plurality of lines of one of the fields. By way of illustration, data may be encoded on lines 21 and 22 of the field 1.

Referring back to FIG. 1, the VBI decoder 24 removes the data encoded in the VBI and provides it on a line 58 to the microprocessor controller 36. The microprocessor controller 36 provides on a line 60 control signals to the VBI decoder 24 for controlling the decoding of the VBI information. VBI decoders are well known in the art and thus are not described in detail herein. The decoded data is used for controlling the operation of the video system 10, such as for VCR recording timer programming or for creating a directory of programs recorded on the tape by storing the directory in the RAM 48.

Data is placed in the VBI of a broadcast television signal by a broadcast television station in a continuous stream. A recipient of the VBI data cannot alter the flow rate of the data stream that is broadcasted. However, a buffer 62, is used for storing the VBI data as it is processed by the VBI decoder 24. Under control of the decoder, all VBI data received by the decoder is stored in the buffer 62 and serially outputted to the microprocessor controller 36. By temporarily storing the data in the buffer 62 the user may utilize this data for operating the video system 10 without the need of searching the RAM 48 to thereby provide faster access time to the data.

The VBI encoder 26 receives on a line 64 control signals and data from the microprocessor controller 36 and encodes such data for recording into the VBI portion of the video signals received from the line 20 and provides the encoded video signals on a line 66 to the VCR 22. The VBI encoder 26 can be implemented in a similar manner as one of those already existing in the art, e.g.,

encoders for encoding closed caption data into the VBI portions of video signals. Although the VBI encoder 26 and the VBI decoder 24 are shown and described as separate units, they can be incorporated into a single semi-conductor chip or implemented by discrete logic components.

FIG. 4 is a schematic diagram illustrating the data encoded video image according to principles of the invention.

As described above, a video broadcast signal 400 is comprised of a plurality of video frames 401. For simplicity, 2½ frames are shown in FIG. 4. In this example, the video broadcast signal 400 comprises, in a time sequence, frames 401-1, -2, -3 corresponding to respective frames 1, 2 and 3. Fig. 4 shows only part of frame 3 for simplicity and clarity. Each frame 401 comprises an odd field 404 ("field 1") of odd scan lines and an even field 405 ("field 2") of even scan lines. The dash number of the reference numeral for the field corresponds to the frame number. For example, the odd field of frame 1 401-1, has the number 404-1. Similarly, the even field of frame 1 401-1 has the reference number 405-1.

The odd field 404-1 of frame 1 401-1 comprises, in a time sequence, a VBI 411-1, a video picture 412-1, a data interval 413-1, and a video picture 414-1.

The VBI 411 is the vertical blanking interval described above. The VBI may contain encoded data. The video picture 412 comprises video signals transmitted on a first part of the video scan lines forming the field. The data interval 413 comprises data signals having encoded auxiliary information that are transmitted as video signals on a second part of the video scan lines forming the field. The video picture 414 comprises video signals transmitted on a third part of the video scan lines forming the field. The video pictures 412, 414 from the fields 404, 405 form the video images that the viewer sees. As will be described below, although the data interval 413 is displayed, it will not be seen by a viewer because it occurs at a rate slower than the human eye can perceive.

The even field 405-1, which follows the odd field 404-1, comprises a VBI 411-2 and a video picture 412-2. The video picture 412-2 comprises video signals transmitted on the video scan lines of the field. Unlike field 1, field 2 does not have a data picture 413-1 encoded therein.

The frame 2 401-2 follows frame 1 401-1. Similarly, frame 2 401-2 comprises an odd field 404-2 and an even field 405-2. The odd field 404-2 has a similar structure to the even field 405-1 of frame 1 401-1 and comprises VBI

411-3 and picture 412-3. The even field 405-2 is again similar and comprises a VBI 411-4 and a picture 412-4.

For simplicity and clarity, FIG. 4 shows only the odd field 404-3 of frame 3 401-3. The odd field 404-3 is similar to field 404-1 of frame 1 401-1. The odd field 404-3 comprises a VBI 411-5 followed by a picture 412-5 followed by a data interval 413-5 and a picture 414-5.

For simplicity and clarity, line synchronization pulses, color burst signals, and other control signals are not shown in FIG. 4. They are well known in the art and are not necessary in the discussion for understanding the invention.

By broadcasting data encoded in a few lines of the picture of the fields and alternating frames on which the data is encoded, a viewer watching the displayed broadcasted video signal will not perceive the data being displayed on the screen. As shown in FIG. 4, the first field of every other frame contains a data interval. Thus, at a rate of 1/60 of a second per field, the data, which is in every fourth field, is displayed every 1/240 of a second. The data interval occurs 15 times a second because it is in alternate frames. This results in little noticeable visual degradation of the video picture because the human brain retains a visual image for a brief period after the image is removed ("persistence of vision"). The human brain typically detects images occurring at a rate of 30 times a second or slower. Consequently, the data occurring at 15 times a second in alternating frames will not be perceived.

FIG. 5 is a timing diagram showing the level of the signals in the picture and data interval in the time interval 5-5 shown in FIG. 4.

The picture 412 comprises a series of lines of video images 501 separated by a horizontal blanking signal 502. As described above, during a raster scan, the beam scans across the screen in a line to form one line of the video image and then scans back to the beginning of the next line. The scan back period between lines is called the horizontal blanking interval 502. After scanning back to the beginning of a line, a data packet 503 is encoded on a plurality of lines to form the data interval 413. Two lines are shown for simplicity and clarity in FIG. 5.

A preamble 504 is used to identify the line as encoded data. The video signal decoder 28 constantly monitors the video signal for the occurrence of a preamble 504 which indicates the start of the encoded data. Following the preamble 504, a data symbol 505 is a set of data representative of the encoded information that is being broadcast on the video signal. In one implementation, the data symbol 505 contains the electronic program guide. The data

transmitted within the auxiliary video information is both encrypted and scrambled. The data is encrypted using a secret key encrypting system, such as the data encryption standard (DES) proposed by IBM and adopted by NBS in 1978. After encryption, the data is scrambled by using a scrambling key to swap bits of the encrypted data. Following the data symbol 505, a postamble 506 identifies the end of the encoded data and may include error detection codes such as cyclic redundancy codes or checksums to ensure data integrity.

In parallel to the video signal decoder 28 monitoring the occurrence of data, the signal is also provided either directly to the VCR 22 or to the mixer 30 where it is subsequently provided to the video display 34. In either case, the data is recorded as a video signal on the tape or displayed as a video signal on the video display 34.

As described above, by using the video signal decoder 28, the microprocessor controller 36, and the RAM 48, the video system 10 can capture data broadcasted in the video and display it either concurrently with or at a later time to the data transmission. The broadcasted data may be transmitted on a plurality of lines in the video during spaced apart fields. Any lines of the raster scan may be used. Moreover, the location of lines containing video data may change between fields or frames. However, using lines near the top or the bottom of the screen where the viewer spends less time watching may allow the repetition rate and the number of lines to be greater. In addition, the number of lines used during a field may vary between fields. Pointers may be used in one line of video to indicate that data is being transmitted in other lines.

The auxiliary video information described in detail below is broadcasted on video lines as described above. After being received, the microprocessor controller 36 decodes the data and stores it in the RAM 48.

When subsequently retrieved, the data is displayed as text on the screen in response to user selected commands.

FIG. 6 is a schematic view showing the format for the video data image packet recorded in the video.

As described above in FIG. 5, the data packet 503 comprises the preamble 504, the data symbol 505, and the postamble 506. The preamble 504 includes a start code 601 to indicate the start of data followed by a type code 602 that defines the type of data that is being transmitted. The type code 602 may also include a code to indicate that the data on one line is a continuation of the data transmitted from previous lines. The data symbol 505 includes a usage symbol 603 for describing what the microprocessor controller 36 is to do with

the data and information symbols 604 that contain the encrypted and scrambled data. The usage 603 code defines whether the received data is to be stored either in a temporary buffer on a printer, a permanent buffer, or to the external RAM. The postamble 506 includes an end code 605 to indicate the end of the data and a checksum 606 for error detection. An error detection code may also be used to ensure data integrity at the video system 10.

Some of the text information contained in the data packet is displayable. When received, these packets are stored according to their types in different locations of the memory.

The information field contains displayable text characters, nondisplayable control characters, and nondisplayable attribute characters. The control characters and attribute characters are executed immediately upon receipt. A control character or an attribute character remains effective until it is overridden by the same control character or an attribute character of a different value. A default mode is defined for each type of control code and attribute. The default is effective at the start of a new data stream, which may be, for example, at the start of each program guide or a page in the guide. Within the data stream, the default remains effective until it is overridden by a control character or an attribute character.

The general form of the information field is as follows: [control] [attribute] [displayable] . . . . [displayable] [attribute] [displayable) . . . .

The control codes include text display size and text page size. Alternatively, the character generator 52 may determine the number of rows and columns and the page size.

The control codes also include a text display mode, such as pop-on style, scroll up style or single line "crawl" style. The control codes also define the character set such as standard line set, an extended character set, Japanese characters, Chinese characters, Korean characters, and the like. The control codes can also control the destination of the data such as to print the data through an infrared port or a serial port to the printer.

Other text display control codes include tab codes for causing the cursor to shift, an indent control code causing the cursor to shift relative to the beginning of a line, and a new line control code causing the cursor to go to the beginning of the next line. Control codes also control storing data in memory or erasing data from memory.

The attribute codes are used for selecting display color, such as a blue background with white characters or other selectable background and foreground

colors, the size of the character set, and whether the data is printable on the screen or hidden. The attribute code may also include the channel-date-length-time information or an encrypted number representative of such information for timer programming the VCR for recording. To facilitate searching in the program guide listing, a key word attribute can be used for defining key words for programs that will be used for searching for user selected programs or user selected criteria.

To facilitate processing of video information, a pointer system may be used. In such system, a pointer in some lines indicates the line numbers of subsequent lines that contain video data. This system is useful for video signal decoders 28 that have limited capability for processing video image data.

AUXILIARY VIDEO INFORMATION

Three types of auxiliary video information are transmitted: program identification (program ID); channel program guide; and program related information (PRI).

The viewer is alerted to the existence of the auxiliary video information in several ways. In a first method, before the program is transmitted, the video system displays on the screen 34 a prompt to the user that information is forthcoming. The prompt may be a flashing icon, such as the letter "I," or a new screen, such as a blue background with white text. The video system 10 requests the user to enter a command, for example, by pressing the "I" button on the remote control 38, to store in the RAM 48 the auxiliary video information or, in some embodiments, to record in a record stack in the RAM an encrypted number corresponding to the channel-date-length-time of a program that is to be recorded. As will be described below, the user may later recall this information.

To indicate that the command was received, the microprocessor controller 36 may either stop flashing the icon display, display an acknowledgement, such as "stored" or "saved", or display a separate screen. The user may request the information before, during or after the broadcast. Alternatively, the auxiliary video information may be initially transmitted and stored in a temporary buffer in the RAM 48. The microprocessor controller 36 then prompts the viewer to enter commands. In this embodiment, the video system transfers the auxiliary video information from the temporary buffer to a designated area of the RAM called a permanent buffer in response to the user selected commands.

Alternatively, in a second method, the video system 10 may provide the prompt after the program is viewed. In this embodiment, the auxiliary video information may be transmitted before the program, during the program, or after

the prompt. In a third method, the prompt is displayed concurrently with the program.

For each method, the user has a predetermined amount of time to request the auxiliary video information. When the auxiliary video information is requested, the video system 10 displays it for either a predetermined time, until the user cancels it (for example, by pressing the program ID button a second time), until the next auxiliary video information is requested, or until the broadcaster transmits a cancel command in the video image.

Because the auxiliary video information is frequently used for advertising, it is desirable to not alert the user to stop recording a program when a commercial occurs. Thus, the time that the auxiliary video information is transmitted is preferably adjusted so that the user can not generate, in response to the auxiliary video information, a signal for shutting off the VCR 22. For example, if the auxiliary video information is always transmitted 30 seconds before the commercial, i.e., 30 seconds is always the lead time, the user may program his VCR 22 to stop recording 30 seconds after the detection of the auxiliary video information and start recording again 60 seconds after the VCR stops recording. But if the lead time is variable, the user misses recording a portion of the program. For example, if the next commercial uses a 60 second lead time, the viewer shuts off the VCR 30 seconds early if the user is using a 30 second lead time. Furthermore, the auxiliary video information may also be transmitted after the commercial so that the user can not shut off the VCR in advance.

Alternatively, the prompt may be a number that the user enters to indicate the auxiliary video information is to be recorded.

Describing the program ID first, the broadcast station preferably broadcasts program identification information on a predetermined line of the video. This information may include the title of the program, the program length in minutes, the present day and time, the station call letters, or a four letter abbreviation of station name (e.g., SHOW for SHOWTIME), and channel number.

In one mode of operation, when the user changes the channel or when recording or playback of the tape begins, the program ID is automatically displayed for a predetermined length of time, e.g., 5 seconds, and then removed. Alternatively, when the user presses the program ID button on the remote controller 38, the video system 10 displays the program ID on the screen 34.

When a program is recorded, the program title may be stored in a directory in the RAM 48. A viewer can access the title of the program being

shown by pressing the "Program ID" key. When the key is pressed, the microprocessor controller 36 commands the video signal decoder 28 to decode selected field and lines of the video either from the broadcasted signals or from the reproduced signals depending upon its mode of operation.

The program I.D. information for a plurality of viewed channels is stored in the RAM 48. Although some of the program I.D. information changes with the program (e.g., program title, start time, length, program category), this information is quickly retrievable from the memory when the user switches channels and requests the program I.D. to be displayed. Using the start time and length of the program, the video system 10 checks, periodically or in response to a Program I.D. command, whether the information is still within the valid time before displaying it on screen.

The channel program guide is the combination of the program IDs for a plurality of programs that will be broadcasted on a particular channel during an upcoming predetermined time. In addition to the information included in the program ID, the channel program guide may also include the channel-date-start time-length data, the titles, and a description of the programs. In addition, the information that is displayed may be controlled by attribute codes contained within the program guide, which are described above. For example, the channel-date-time-length encoded numbers may be printable on screen, but if it is preceded by a "non-print" attribute, the microprocessor controller 36 does not display it. As a second example, special events may be highlighted by using a character attribute.

A broadcasting station broadcasts, on a periodic basis, the channel program guide in the video frames of the broadcast. The video signal decoder 28 continuously decodes the channel program guide from the video frames and stores it in the RAM 48. Because of unexpected events, such as sport programs that overrun their scheduled broadcast time or news breaks that shift programs, the broadcaster may update the program guide and transmit the new guide. Accordingly, as the new guide is read, the microprocessor controller 36 stores it in the RAM 48.

By way of background, the temporary and permanent buffers of the RAM 48 described above operate in a circular mode in which an old data packet stored in the buffer is overwritten by a new data packet that is received. The guide memory also operates in this circular mode.

The program guide may also include a video program guide of special programs, such as video magazines, video sales catalogs, video classified ads, and infomercials. The program guide allows the user access to a television program listing for those who do not have a periodical listing or newspaper listing, or those who misplaced their listings.

The format of the channel program guide data packet is described above in conjunction with FIG. 6. As the data is decoded, the data stored in the RAM 48 is updated by each subsequent data packet. The quantity of information supplied in the data packet is determined by the broadcaster. For example, the broadcaster may provide program schedules for the subsequent week but provide only the description of the programs for the next day. In addition, the guide may also include special events for the upcoming few weeks. By viewing the listing before the viewer goes to work or goes to sleep, the user may program his video system 10 using the program guide for recording shows during his absence or sleep.

When the viewer switches to a different channel, the video system 10 will begin reading and storing the program guide data for the new channel. However, because many viewers switch between channels, sufficient memory may be provided so that the program guides for at least two channels may be stored in the RAM 48.

The stored program guide may be used to implement timer programming of the VCR. Using the remote control 38, the user programs the VCR 22 to record the desired program by moving the cursor to this program and pressing the Record button. In embodiments in which the channel-date-time-length encoded numbers are displayed on the screen, the viewer may also program the VCR 22 by entering on the remote controller 38 the encoded number for the program to be recorded. In response thereto, the microprocessor controller 36 stores the encoded number into its VCR programming stack in the RAM 48 for execution as described below.

Although the program guide has been described as being unique for each channel, the video system 10 is not so limited. The program guide for a plurality of channels may be broadcast on each of the plurality of channels or a separate dedicated channel.

Operation

Having described the program guide, the operation of the video system 10 is now described.

FIG. 7 is a flowchart showing the steps employed in the operation of the video system according to principles of the invention.

The microprocessor controller 36 continues in a ready state (step 701) until it detects a guide command provided by the user via the remote control 38 (step 702). In response thereto, the microprocessor 36 retrieves from the RAM 48 a menu of categories that the viewer can select from to view the program guide (step 703). In one embodiment, the microprocessor controller 36 generates a guide that is a composite of the guides from a plurality of broadcast channels. Alternatively, the microprocessor controller 36 may provide a program guide for the television channel that is presently being viewed.

The microprocessor controller 36 provides the corresponding command and position characters to the character generator 52 that retrieves the corresponding bit map from its internal ROM and modulates such data onto a video signal which the character generator provides to the mixer 30 and subsequently to the video display 34 for displaying the menu (step 704).

To exit a menu at any time, the user presses the exit button (step 705). In response thereto, the microprocessor controller 36 commands the mixer 30 to provide the video signal that the viewer was watching prior to entering the guide routine (step 706). The program guide program allows the user to sort the entries in the guide by various categories such as day, time or type of program. As will be described, the microprocessor controller 36 stores the user's selections for recording programs in the RAM 48.

Upon entering the guide program, at step 704, the microprocessor controller 36 displays the program menu of FIG. 8. The program menu provides a selection of different sorts of program listings. The menu allows the viewer to select the data or category of programs that are to be displayed. The categories in the menu shown in FIG. 8 are for the purposes of example only. The invention is equally well adapted for other sorting categories. Other sorts may be movie situation comedies, soap operas, new sports and children shows. The microprocessor controller 36 will display a menu like the calendar-by-date menu of FIG. 9 except that these menus have an additional column for the date of the show. The programming of these other sorts is similar to that of the calendar-by-date menu shown in FIG. 9.

As described above in the data format of FIG. 6, the program guide includes the title of the program, category codes for sorting, and channel-date-time-length (CDTL) information for each program. The user makes a selection using the cursor keys (step 706) and enter key on the remote control

38 (step 707). Menus frequently have multiple pages which may be advanced by using in combination the keypad, the cursors, and the page key. Upon detection of the user request, the microprocessor controller 36 retrieves the data corresponding to the program listing (step 708) and displays a menu corresponding to the selection (step 709). For example, if the user wants to see a program guide for a particular date, after the user enters the date by using the keypad on the remote control 38, the microprocessor controller 36 reads from the RAM 48 and sorts by the selected date. Upon completion of the sort, the microprocessor controller 36 displays a calendar-by-date menu as shown in FIG. 9. The calendar-by-date menu has columns for CDTL codes, channels, start time and title. Alternatively, the codes may be replaced by sequential line numbers to allow random access selection of programs by line number.

The user may select to record a program by entering the coded number or the line number of the program which is used to program the VCR as described below (step 710).

The microprocessor controller 36 detects whether the record key has been actuated. If the record key has been actuated (step 710), the VCR stores the CDTL code number corresponding to the selection in a programming stack that is used for timer programming the VCR (step 711) as described below to otherwise, the microprocessor controller 36 continues displaying the menu until a EXIT command is sent (step 712).

Timer Programming

The VCR 22 can optionally be programmed to perform recording at a later time using the CDTL encoded numbers. A recording or programming stack in the RAM 48 stores the CDTL encoded number settings for a plurality of programs selected to be recorded.

When the microprocessor controller 36 is interrupted by a record command, such as step 711 in FIG. 7, it checks whether the CDTL buffer in the memory is full. If the buffer is not full, the microprocessor controller 36 displays a screen requesting the user to enter a CDTL code number. The microprocessor controller 36 then waits for an input from the user. The user enters the CDTL encoded number by pressing the number keys on the remote control 38 and pressing enter. In response to an enter command, the microprocessor controller 36 checks whether the input number is a valid CDTL encoded number.

If the inputted number is an invalid number, the microprocessor controller 36 displays a prompt to the user to reenter the CDTL number. If a cancel key is pressed, the VCR recording is cancelled for that number.

On the other hand, if the CDTL encoded number is valid, a check is made to determine whether there is a conflict between the newly selected program and previous recorded programs. A conflict occurs when the CDTL number setting is for a recording which will occur at the same time as another scheduled recording. If there is no conflict, a prompt is displayed to request the user to enter a number corresponding to recording the program once, weekly or every weekday. Pressing any other key other than the three keys is ignored by the microprocessor controller 36.

Upon receiving one of the three commands, the microprocessor controller saves the input. A confirmation screen is then displayed confirming the recording data, such as channel number, date, start time, stop time, and recording option (i.e., whether the recording is to be performed once, weekly or daily).

If the data on the confirming screen is correct, the user presses the enter key and the recording is set. Otherwise, if the data is incorrect, the user can press the cancel key to reenter the CDTL encoded number. If the CDTL buffer is already full when the record key is pressed a warning screen is displayed which advises the user that the buffer is full and that he needs to delete a program from the buffer before another program can be added. As part of the warning screen, the user can be advised that he can review the list of programs stored in the CDTL buffer so that he can delete one or more programs to make room for the new setting. The user is also advised that he can press the cancel key to exit the timer programming routine. Upon pressing the review key, the viewer can review the CDTL encoded number settings. In response to a review command, the microprocessor controller 36 retrieves the CDTL number settings from the CDTL buffer. Based upon this data, the microprocessor controller 36 displays the programs to be recorded. This display may comprise a number associated with the entry, the channel number of the program recorded, the date of the program, the time of the program, and either the length of the program or the end time of the recording.

The microprocessor controller 36 can receive information from the VCR 22 indicating whether there is a tape in the VCR and its length. The microprocessor controller 36 uses this information to inform the viewer to enter a tape into the VCR 22 and advise if additional tape is needed.

If the newly entered CDTL encoded number conflicts with an existing CDTL number stored in the buffer, a screen is displayed which shows data such as the channel date, start time and stop time of both the newly entered setting and the existing setting that conflicts. The microprocessor controller 36 then waits for the user to press the cancel key to delete either the new entry or delete the old entry.

The microprocessor controller 36 puts the starting time of the earliest CDTL encoded number entry into a timer. When the timer equals the time of day clock, after the microprocessor controller 36 is interrupted, it executes a recording procedure to command the VCR 22 to record the selected program and deletes the program selection from the record stack. In addition, the microprocessor controller 36 commands the tuner 12 to the channel corresponding to the CDTL encoded number.

After elapsed time equal to the length of the program, the microprocessor controller 36 commands the VCR to stop recording.

Creation of the Program Guide in Memory

The creation of and the storing of a program guide in memory are now described. During normal system operations, the video signal detector 24 constantly monitors the video image for program guide information. Upon detection of the preamble, the microprocessor controller 36 stores the corresponding program guide data in the RAM 48. The microprocessor may display an indication, such as a icon, e.g., the letter "g", to the user to alert him that the electronic program guide has been recorded.

The RAM 48 is preferably partitioned into guide memory spaces for each selected channel. Each time the microprocessor controller 36 changes the channel of the tuner, the controller overwrites the section of memory allocated to that channel with the newly received program guide. Thus, the entire guide memory forms a program guide for all channels.

Alternatively, the program guide for all channels may be broadcast on one channel.

Program-related Information

Program-related information (PRI) is information broadcasted in the video frame and that is related to the program being aired in the remainder of the video frame which is available upon user command, either concurrently with the program or at a late time. The use of PRI extends the time of an advertisement

because the viewer is able to view the information at a later time at a pace selected by the viewer. Examples of PRI includes statistics of baseball players during a baseball game, recipes given out during a cooking lesson, and problem assignments and answers after an educational program. In other examples, many commercials during the program urge the viewer to call a toll-free number to get further information or to place an order or give details about an upcoming sales event or promotion. In existing systems, such information which is conveyed in the video is fleeting, because most viewers are either not disposed to take any action on the spur of the moment or are unprepared to take such action. The PRI is transmitted in the video frame and may be captured and displayed on screen on the command of the user. Thus, the PRI may repeat the information provided during commercial or program or may contain additional information. For example, the commercial may be a promotion about an upcoming movie while the PRI for this commercial may provide additional details about the cast or plot of the movie. Further, a CDTL encoded number may be provided so that at the press of a single button, the CDTL encoded number is used to program the VCR 22 to record the requested program. Alternatively, the commercial may be a short commercial which is a promotion for a long commercial such as an infomercial aired in the middle of the night.

The broadcast station broadcasts the PRI in a time window during which it is related to the program or commercial being broadcast. Alternatively, the PRI may be broadcast offset in time from the program or commercial. The PRI is typically repeated throughout the time window. The PRI is preferably set on one or more video lines as described above. The video system 10 continuously reads the video for the PRIs. Each PRI has an ID number as part of the information symbol so that the video system 10 recognizes when the PRI is repeated during a commercial or in a rerun of the commercial. When the ID number of the present PRI equals the ID number of a PRI in either the temporary or the storage buffers, the video system 10 overrides the old PRI in the buffer. Otherwise, if there is not a match of ID numbers, the video system determines whether the temporary buffer is full. If it is full, the microprocessor controller 36 overrides previously stored PRIs on a first-in-first-out (FIFO) basis. Otherwise, the video system 10 stores the new PRI in the temporary buffer. In addition to monitoring the video lines for PRIs, the video system 10 also monitors for user selected commands. If a store command is detected, the microprocessor controller 36 determines whether a storage enable bit is set, which if it is not set during the broadcast, then the PRI is not storable, i.e., PRI can be stored only in the

temporary buffer and not in the storage buffer. If the storage enable bit is set, the video system 10 deletes the PRI from the temporary buffer and stores it in the storage buffer. The microprocessor controller 36 then displays an acknowledgement message such as "stored" on the screen 34 if an acknowledgement bit is set. The microprocessor controller 36 then continues monitoring the PRI.

If, however, a stored command has not been set or the storage enable bit is not set and a review command is not detected, the video system 10 returns to reading the PRI. Otherwise, the microprocessor controller 36 displays in a list on the display the titles of the PRIs (the first line of the PRI) stored in the buffers. The viewer is able to move through the list of displayed PRIs using the cursor keys on the remote control 38. The PRI that it is pointed to is highlighted by reverse video or by other methods well known in the art. If a play command is sent, the microprocessor controller 36 plays the PRI. When the PRI is displayed, the user must either store the PRI in the storage buffer by pressing the store button or delete the PRI from either temporary or storage buffer by pressing the erase button. By pressing the print button, the user can print the PRI. Printing may be done either to a printer or other device connected to the serial port by pressing the record or send button. As the list is displayed, PRIs stored from earlier broadcasts are displayed. The PRIs from later broadcasts that are stored in the temporary buffer are also displayed. At a later time when the user presses the review button again, PRIs in the temporary buffer may be replaced by new PRIs while PRIs in the storage buffer remain unchanged.

For PRIs that contain CDTL encoded numbers referring to other related programs that are to be broadcasted later, when the user presses the second button, the microprocessor controller 36 stores the CDTL coded number in its programming stack for subsequent recording. The microprocessor controller continues to display the buffer content until the user presses the exit key.

The embodiment discussed above uses the store button and the review button for storing and reviewing PRIs. Alternatively, these functions may be done by a single button such as the I button. Pressing the I button one time may invoke the storage function while pressing it twice in a row may invoke the review function.

In the foregoing, certain values and representations are used to facilitate description and understanding of the invention. For example, operations of the microprocessor controller 31 are described as being responsive to actuation of certain keys ("RECORD", "PLAY", "I", etc.). It will be understood, however, that

such keys may be implemented by any predefined sequence of keys. Therefore, the foregoing description should not be read as pertaining only to the precise structures and techniques described, but rather should be read consistent with, and as support for, the following claims, which are to have their fullest and fair scope.

WHAT IS CLAIMED IS:

1. A video system comprising:

a receiver adapted for receiving broadcasted video signals;

a decoder coupled to said receiver adapted for decoding data contained in a video image of said broadcast video signals to produce information signals containing the data;

a memory for storing said information signals; and

a controller receiving said information signals and displaying said data.

2. The video system of claim 1 wherein the information signals comprises a television program listing.

3. The video system of claim 1 wherein said information signals represent auxiliary information related to a first video program.

4. The video system of claim 3 wherein said auxiliary information includes information relating to programming schedule of a second video program.

5. A remote controller for operating a video system, said video system having a receiver receiving a first program of broadcast video signals, said broadcast video signal including a video image, the remote controller comprising:

a plurality of keys;

an interface circuit for generating remote control signals to said video system; and

a control circuit responsive to actuation of one or more said keys for triggering said circuit to generate remote control signals to said video system and causing said video system to decode signals from said video image to manage operation of the video system.

6. The remote controller of claim 5 wherein said control circuit comprises means responsive to actuation of a key for causing said video system to decode from said video image representing the broadcast schedule information of a second program related to said first program.

7. The remote controller of claim 6 wherein said broadcast information includes channel, date, time, length information of broadcast of said second program.

8. A method of providing items of information viewable on an electronic display from a broadcaster to a user comprising the steps of:

transmitting the information to the user in a first video image of a broadcast signal along with at least a portion of a second video image;

detecting the first video image;

detecting the information in the first video image and providing it to a memory; and

storing in the memory the items of information.

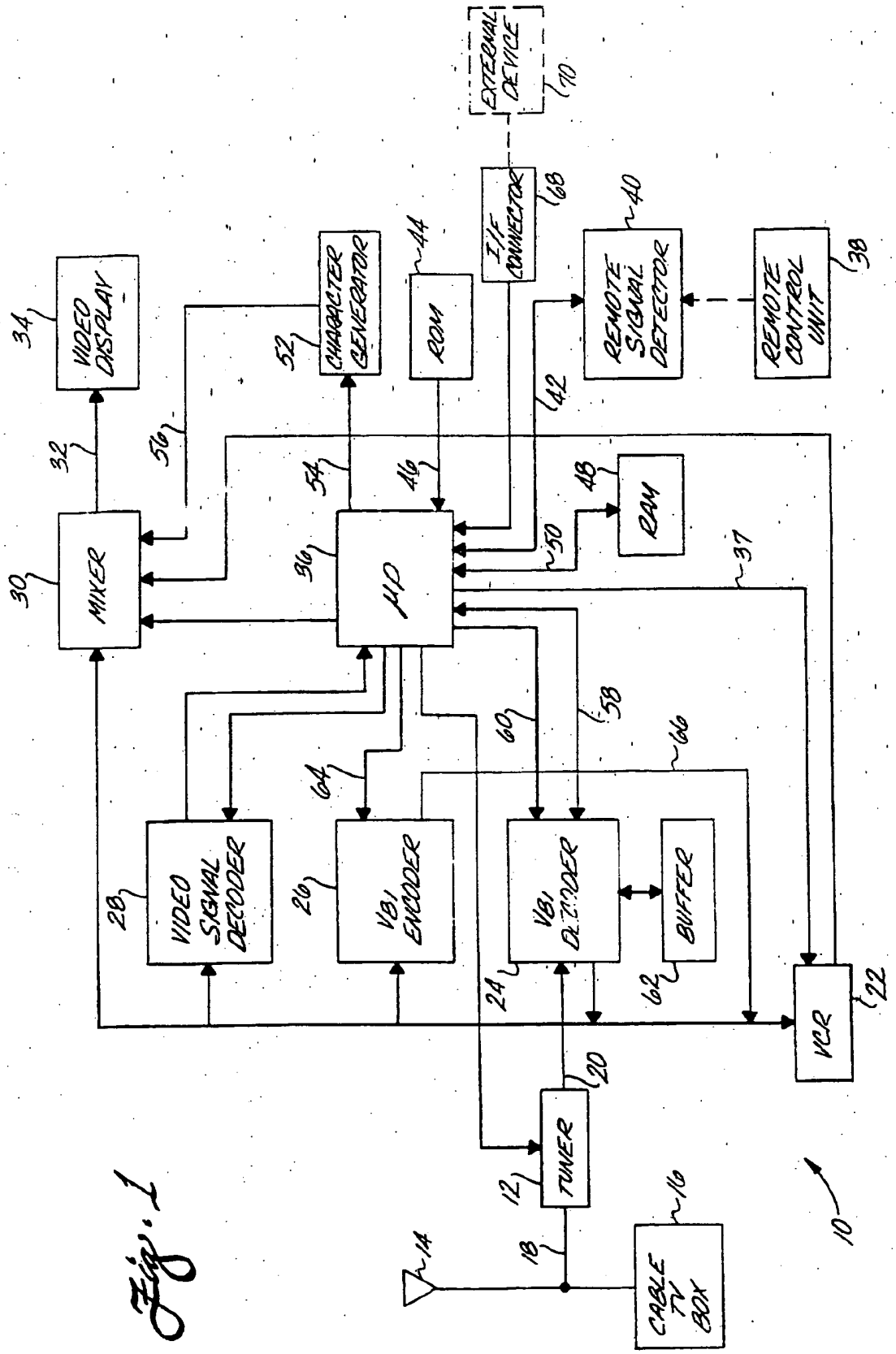

EXTERNAL DEVICE
70
I/F CONNECTOR
68
REMOTE SIGNAL DETECTOR
40
REMOTE CONTROL UNIT
38
CHARACTER GENERATOR
52
ROM
44
VIDEO DISPLAY
34
42
56
32
54
46
48
RAM
MIXER
30
μP
36
50
37
58
60
66
64
VIDEO SIGNAL DECODER
28
VBI ENCODER
26
VBI DECODER
24
BUFFER
62
VCR
22
TUNER
12
20
14
18
CABLE TV BOX
16
10

Fig. 1

Fig. 2

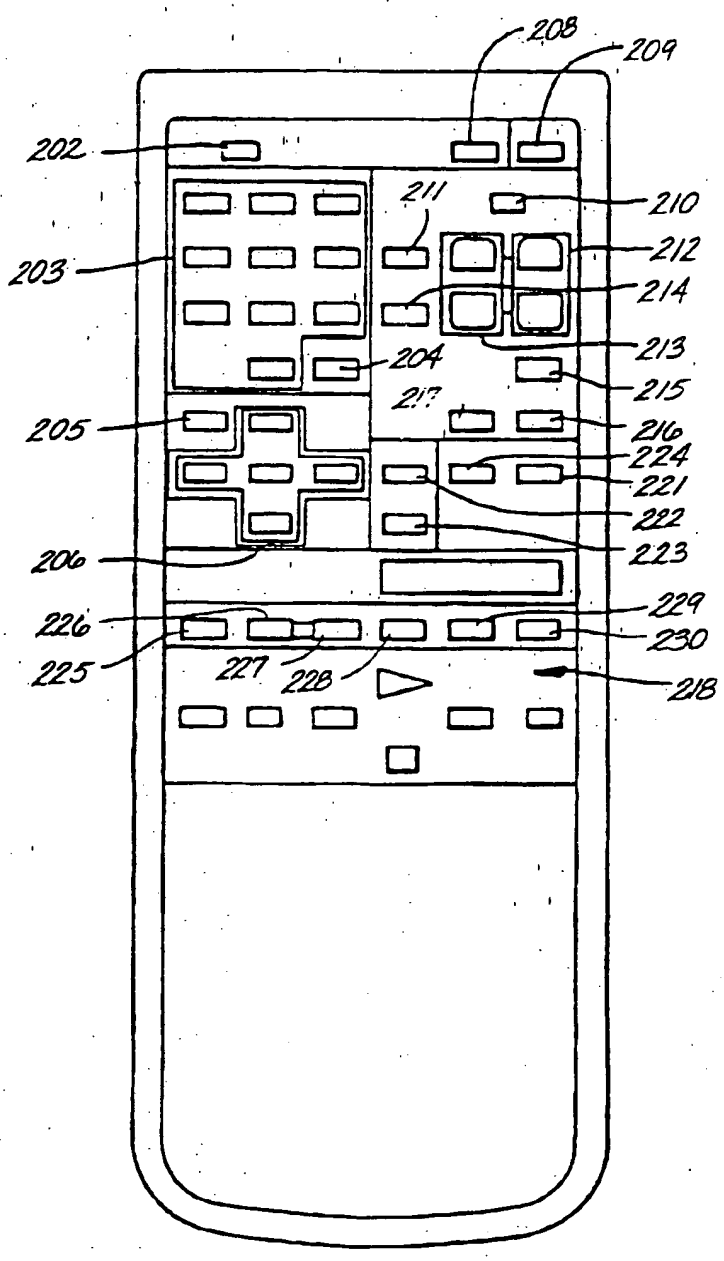

208
209
202
211
210
203
212
214
213
204
215
217
205
216
224
221
222
206
223
229
226
230
225
227
228
218

Fig. 3

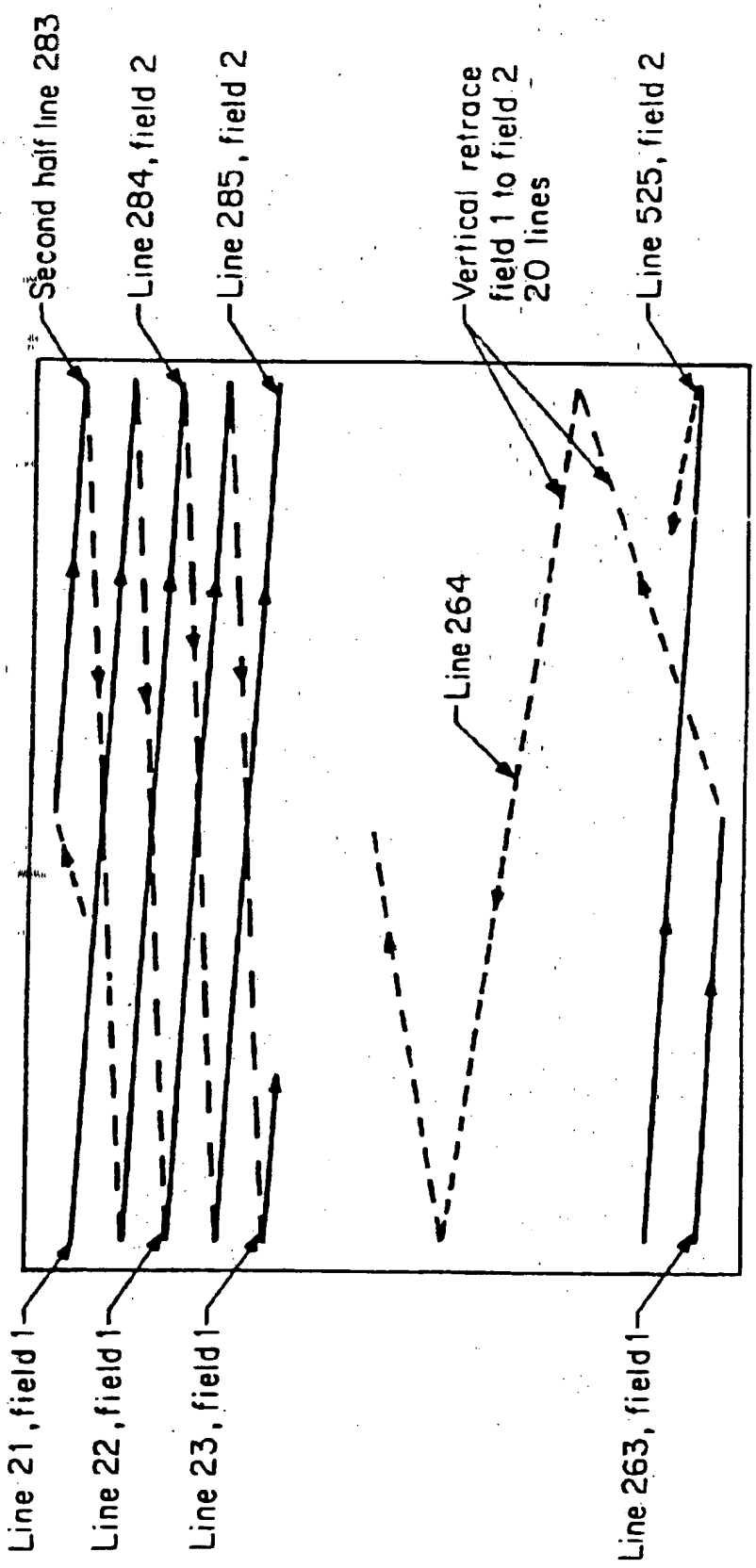

Second half line 283
Line 284, field 2
Line 285, field 2
Vertical retrace field 1 to field 2 20 lines
Line 525, field 2
Line 264
Line 21, field 1
Line 22, field 1
Line 23, field 1
Line 263, field 1

Fig. 4

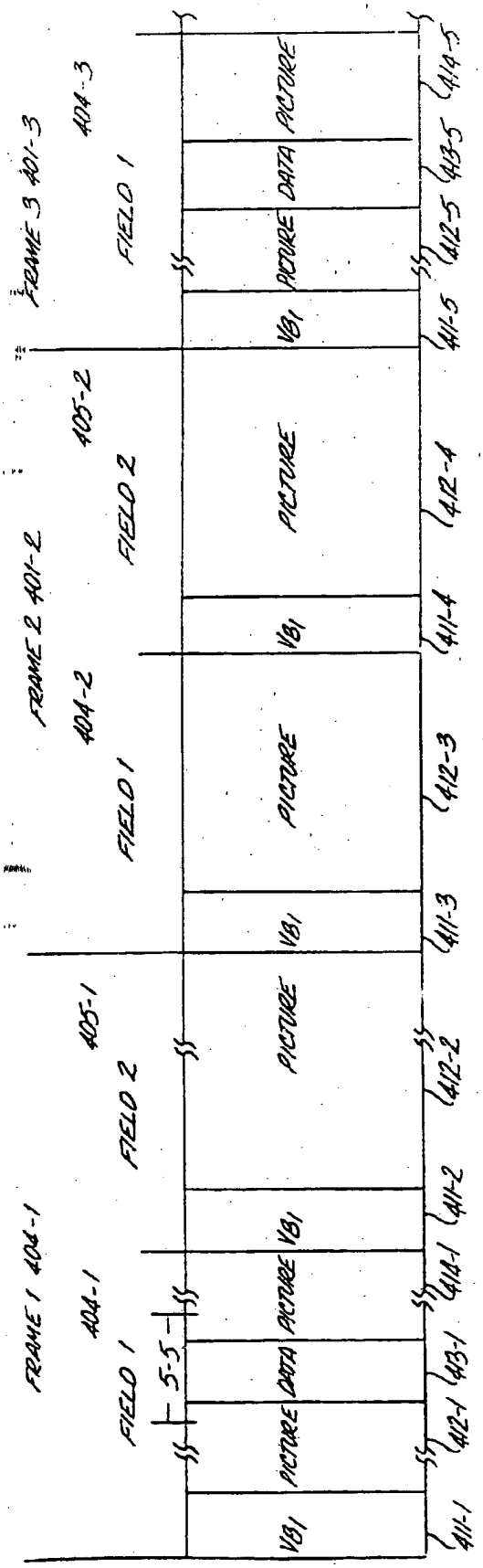

FRAME 1 401-1
FRAME 2 401-2
FRAME 3 401-3
404-1
404-2
404-3
405-1
405-2
FIELD 1
FIELD 2
FIELD 1
FIELD 2
FIELD 1
5-5
VBI
PICTURE DATA
PICTURE
411-1
412-1
413-1
414-1
411-2
412-2
411-3
412-3
411-4
412-4
411-5
412-5
413-5
414-5
400

Fig. 5

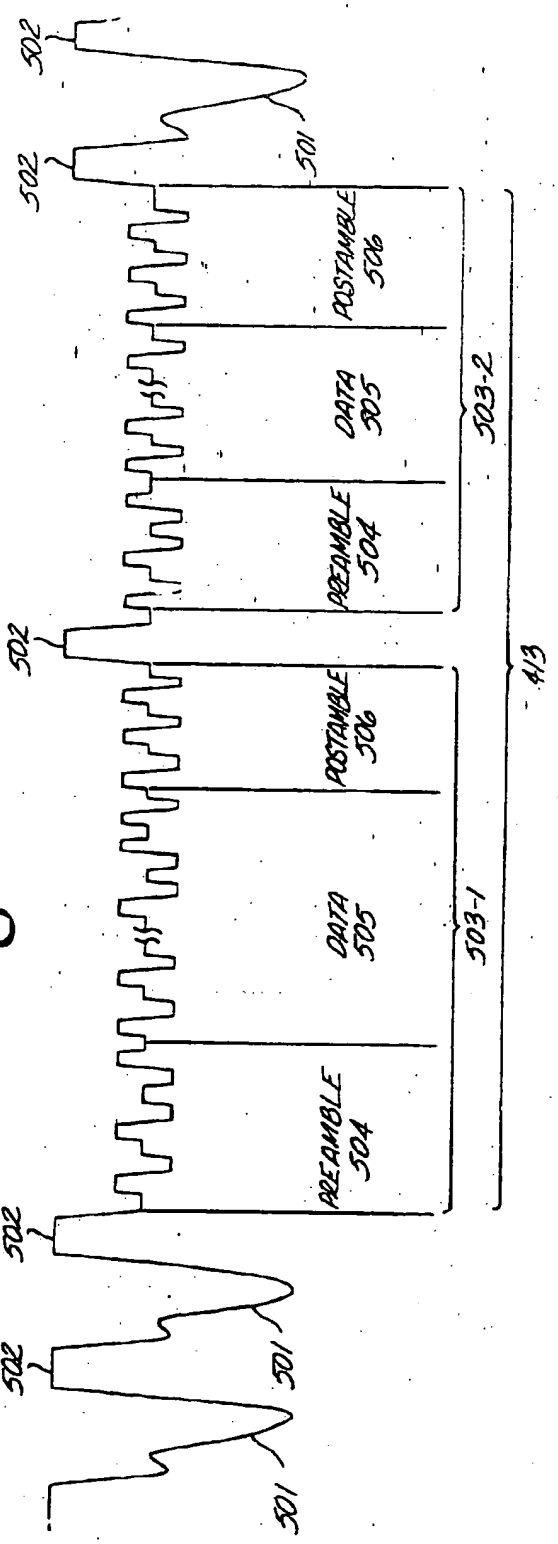

501
502
PREAMBLE 504
DATA 505
POSTAMBLE 506
503-1
503-2
413

Fig. 6

503
504
505
506
START CODE
TYPE CODE
USABLE
INFORMATION
END CODE
CHECKSUM
601
602
603
604
605
606

Fig. 7

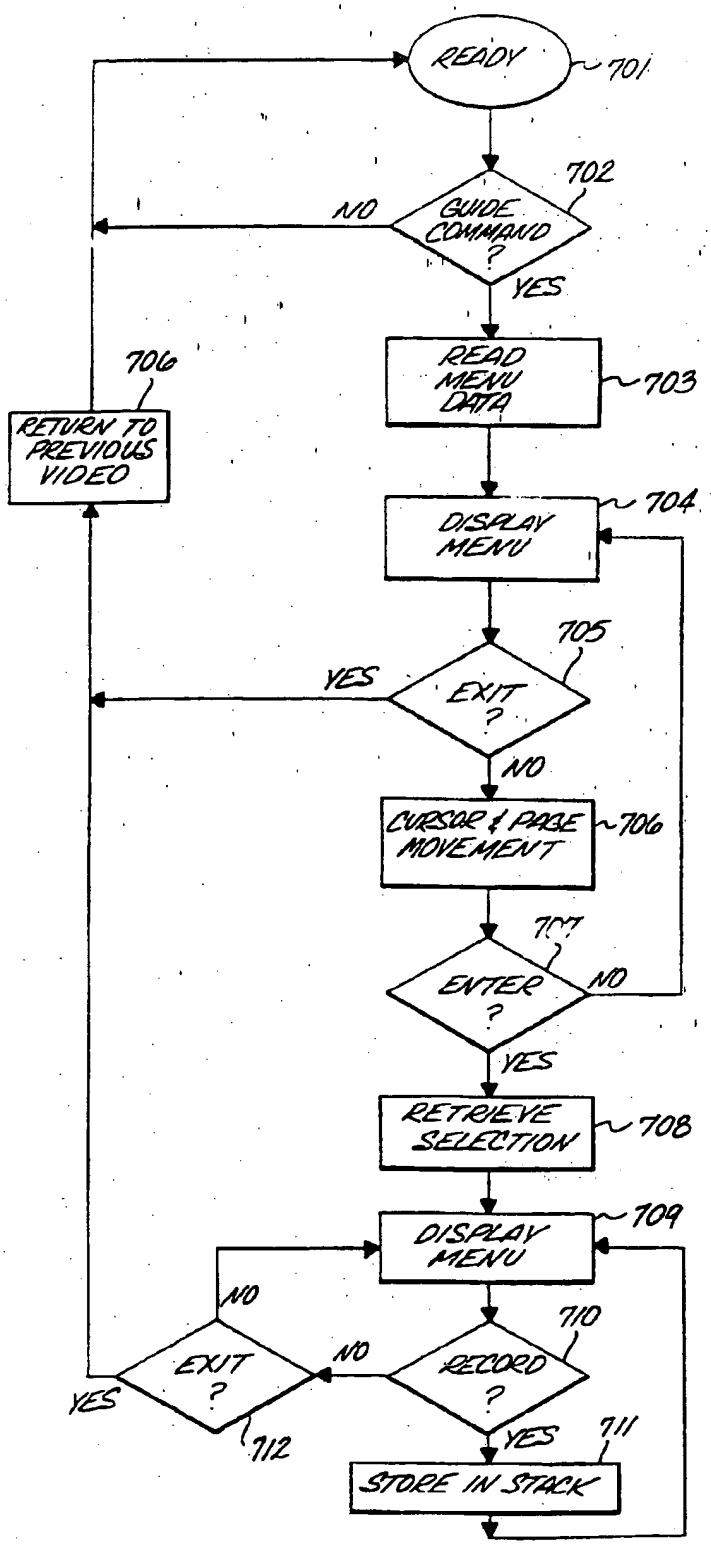

READY
701
GUIDE COMMAND ?
702
NO
YES
READ MENU DATA
703
DISPLAY MENU
704
EXIT ?
705
YES
NO
RETURN TO PREVIOUS VIDEO
706
CURSOR & PAGE MOVEMENT
706
ENTER ?
707
NO
YES
RETRIEVE SELECTION
708
DISPLAY MENU
709
RECORD ?
710
NO
YES
STORE IN STACK
711
EXIT ?
712
NO
YES

Fig. 8

TV/VCR MENU

1. CALENDAR BY DATE: ____
2. MOVIES
3. SIT COM
4. SOAPS
5. NEWS
6. SPORTS
7. CHILDREN

Fig. 9

CALENDAR BY DATE: 2/9/94

CODE	CH	TIME	TITLE
9271	2	8:00AM	PETER PAN & THE PIRATES
2586	7	8:00AM	GETTING FIT
674154	9	8:00AM	NEWS
448797	5	8:30AM	BOWLING
54769	7	8:30AM	DISCOVER THE WORLD
84762	HBO	9:00AM	MOVIE: COWBOYS DON'T CRY
75943	SHOW	9:00AM	MOVIE: AWAKENINGS

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US94/09857

A. CLASSIFICATION OF SUBJECT MATTER

IPC(6) :H04N 5/782, 7/08, 5/76
US CL :348/460, 461, 906, 473, 563, 734; 358/335

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : Please See Extra Sheet.

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

358/142(foreign)

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

APS: (program?(2a)(vtr or vcr or video(w)record?) and ((guide or schedul?) and (title or channel) and date and time) and 348/clas

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US, A, 4,908,707 (KINGHORN), 13 March 1990, whole patent, especially FIG 3.	1-8
Y,P	US, A, 5,260,788 (TAKANO ET AL.) 09 November 1993, see whole document.	1-8
A	US, A, 4,873,584 (HASHIMOTO) 10 October 1989, see FIG1, especially PRINTER 6.	1
Y	US, A, 4,751,578 (REITER ET AL.) 14 June 1988, see whole document.	1-8
Y	US, A, 5,038,211 (HALLENBECK) 06 August 1991, see column 2, line 20 through column 3, line 30.	1-8
Y	US, A, 4,977,455 (YOUNG) 11 December 1990, see FIG 1.	1-8

[X] Further documents are listed in the continuation of Box C. [ ] See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be part of particular relevance

"E" earlier document published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
12 DECEMBER 1994	17 JAN 1995
Name and mailing address of the ISA/US Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231 Facsimile No. (703) 305-3230	Authorized officer Sefet Mejahic Telephone No. (703) 305-4741

Form PCT/ISA/210 (second sheet)(July 1992)*

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US94/09857

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y,P	US, A, 5,253,066 (VOGEL) 12 October 1993, see FIG. 5 and column 5, line 66 to column 7, line 4.	1-8
A	AU, B, 49420/90 (YUEN) 01 August 1990, see whole document.	1, 5, 8
A	GB, A, 2 256 549 (SCHICK) 09 December 1992, see whole document.	1, 5, 8
A	US, A, 3,842,196 (LOUGHLIN) 15 October 1974, see FIG. 1.	1, 8

B. FIELDS SEARCHED
Minimum documentation searched
Classification System: U.S.

IPC (6): H04N 5/782, 5/78, 5/76, 5/445, 7/08, 7/00.
US CL: 348/460, 461, 906, 473, 563, 734, 476, 478, 474, 468, 552, 569, 570, 564, 731, 725, 553; 358/335, 310; 360/33.1, 55, 69

BOX II OBSERVATIONS WHERE UNITY OF INVENTION WAS LACKING
This ISA found multiple inventions as follows:

This application contains the following inventions or groups of inventions which are not so linked as to form a single inventive concept under PCT Rule 13.1. In order for all inventions to be examined, the appropriate additional examination fees must be paid.
Group I, claim(s) 1-4 and 8, drawn to a video system for transceiving programming data.
Group II, claim(s) 5-7, drawn to a remote controller.
The inventions listed as Groups I and II do not relate to a single inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons: In the instant case, Groups I and II do not meet the requirements set forth in PCT Rule 13.2. Specifically, the Group I invention (e.g., program data transceiving system) does not require the technical features of the remote control, represented by Group II because any conventional remote controller, as well as any receiver-mounted keypad controller, could have been used instead of the claimed remote controller of i.e., claim 5. The Group II invention has separate utility such as in controlling a teletext decoder, VCR, prior art programming video systems, or the like.